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FLOOD INSURANCE STUDY

ORIGINAL



COMPLETED

21

VILLAGE OF UTICA,
OHIO
LICKING AND KNOX COUNTIES



JUNE 15, 1982



Federal Emergency Management Agency

COMMUNITY NUMBER - 390338

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Panel 01P

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
VILLAGE OF UTICA,
LICKING AND KNOX COUNTIES, OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Utica, Licking and Knox Counties, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the Village of Utica to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Department of Agriculture, Soil Conservation Service (SCS) for the Federal Emergency Management Agency, under Inter-Agency Agreement No. I-AA-H-11-79, Project Order No. 3. This study was completed in June 1981.

1.3 Coordination

Organized by FEMA, the first community meeting was held on November 17, 1978, and was attended by representatives of the Village of Utica, Ohio Department of Natural Resources, FEMA, and the SCS. The nature and purpose of the Flood Insurance Study was explained and then study limits were determined. A notice announcing the study and stating its objectives appeared in the Newark Advocate on July 14, 1979.

The Ohio Department of Natural Resources served as the state-coordinating agency for this study. Representatives of the Village of Utica and the SCS reviewed the proposed floodway and flood boundary information in a meeting on May 26, 1981.

On February 1, 1982, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Utica, Licking and Knox Counties, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction for the next five years, through June 1986.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Utica.

The North Fork Licking River was studied in detail from about 1,700 feet downstream of State Route 13 to about 100 feet upstream of Torrens Road.

Approximate methods were used to study an unnamed tributary between Crestview Drive and North Street.

2.2 Community Description

The Village of Utica is located in central Ohio approximately 13 miles north of downtown Newark. The village is situated in north-central Licking County along the Knox-Licking Counties line. Utica is surrounded by unincorporated areas of Knox County to the north and Licking County on all other sides. Utica's population increased from 1,977 in 1970 to 2,235 in 1980 (Reference 1).

The climate is temperate with relatively cool to cold winters and mild to warm summers. Average annual precipitation is approximately 39 inches and is distributed unevenly, producing a dry harvest season during late summer and early fall. Average monthly temperatures range from 30-40 degrees Fahrenheit (F.) in January to 70-80 degrees F. in July (Reference 2).

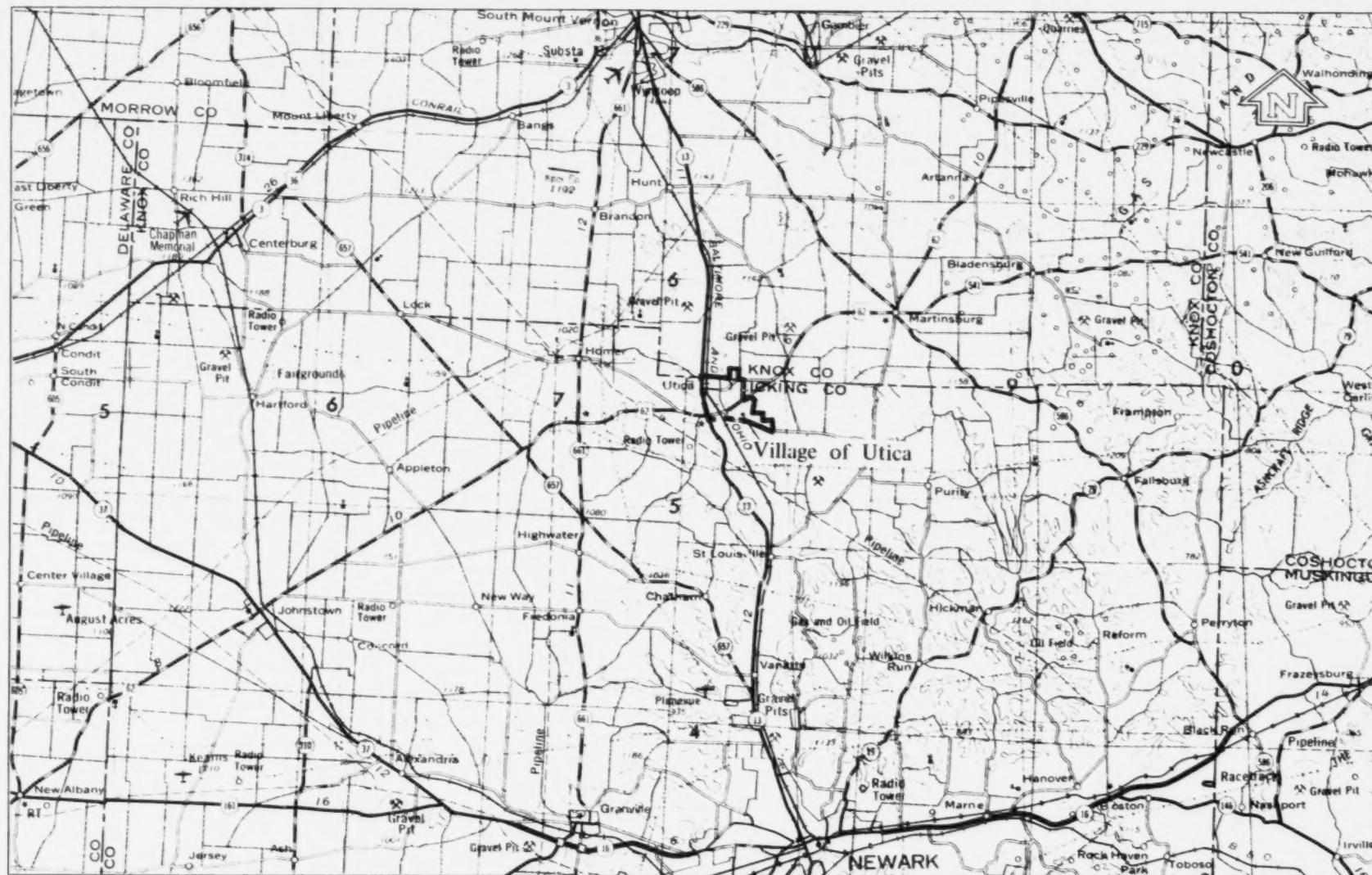


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF UTICA, OH
(LICKING AND KNOX COS.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

The areas subject to flooding contain nearly level soils which have formed on recent alluvial deposits. These soils are dark in color, deep and well drained.

The peripheral areas on the east side of the village have experienced new residential development. Some residential and commercial development has occurred in the floodprone areas along the North Fork Licking River near the intersection of U.S. Route 62 and State Route 13. Presently, the remainder of the flood plains within the village are relatively free of development.

2.3 Principal Flood Problems

Flooding caused by locally heavy thunderstorms on the North Fork Licking River occurred in Utica on September 14, 1979. A flood of this magnitude would be expected to be equalled or exceeded once in 20 years on the average, with a discharge of 10,200 cubic feet per second (cfs) and an elevation of 749.2 National Geodetic Vertical Datum (NGVD) measured at the State Route 13 gaging station. A similar flood occurred in Utica in January 1959 (Reference 3). Other serious floods occurred in 1898, 1913, 1964, 1968 and 1975. The average annual economic flood damages in Utica are presently moderate; however, this could increase dramatically if development is permitted in floodprone areas.

2.4 Flood Protection Measures

The construction of a flood control dam on the North Fork Licking River upstream of Utica was authorized by the Flood Control Act of 1968 (Reference 4). Utica Lake would control a drainage area of 113.8 square miles and reduce flood crests along the North Fork Licking River. This U.S. Army Corps of Engineers (COE) dam would be situated in Knox County, but would have a considerable impact on potential flooding in Licking County. The project is presently in an inactive status because of marginal economic feasibility and lack of state and local support. The uncertainty of the project completion prevented it from being considered in this study.

A levee was constructed by the COE in the southwest corner of the village; however, construction in the area has destroyed parts of the levee and eliminated it as an effective flood protection structure.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 per cent

chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one per cent chance of annual occurrence) in any 50-year period is about 40 per cent (four in ten), and for any 90-year period, the risk increases to about 60 per cent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

The proposed discharge information was sent to local, state and Federal agencies on June 10, 1980 with a request for review and comment. A response was received from the U.S. Geological Survey (USGS) and the COE. Discharge values from both the USGS and the COE and those proposed for this study were within an acceptable range of difference.

The discharge-frequency information for the North Fork Licking River was developed using the regression equations in "Floods in Ohio, Bulletin No. 45" (Reference 5). Parameters of the equations included drainage area and main channel slope.

Since Bulletin No. 45 does not contain prediction equations for the 500-year frequency storm, this value was obtained by extrapolating on log-probability paper from the other frequency values.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS)			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
NORTH FORK LICKING RIVER					
State Route 13	116	7,900	10,800	12,000	14,900

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

The cross sections were obtained by a photogrammetric survey. The channel part of the cross sections was obtained by field surveys using transit-stadia methods.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Channel roughness factors (Manning's "n"), used in the hydraulic computations, were chosen by engineering judgment and based on field observations of the streams and flood plains. On the North Fork Licking River, the "n" values ranged from 0.040 to 0.045 for the channel and from 0.085 to 0.12 for the flood plain. The reach lengths, distance between sections, were measured from USGS quadrangle maps with a 1:24000 scale and a 10-foot contour interval (Reference 6).

Starting elevations for the North Fork Licking River were taken from the water-surface profiles computed for the Unincorporated Areas of Licking County Flood Insurance Study (Reference 7).

Flood elevations of the detailed study areas were estimated through use of the SCS computer program WSP-2 (Reference 8), which utilizes the standard step method to compute water-surface elevations.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 6). Approximate flooding for the unnamed tributary was taken from the Flood Hazard Boundary Map (Reference 9).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood height of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The SCS floodway computer program was used to make the computations (Reference 10). The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2). Portions of the floodway extend outside the corporate limits.

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH ² (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
NORTH FORK LICKING RIVER							
A	2310	253/115	2527	4.7	949.8	948.8	1.0
B	4520	138/15	1514	7.9	953.6	952.6	1.0
C	6090	230/95	2358	5.1	955.5	954.5	1.0
D	8180	427/380	3301	3.6	958.1	957.1	1.0

¹ FEET ABOVE LIMIT OF FLOODING AFFECTING COMMUNITY 1700 FEET DOWNSTREAM OF STATE ROUTE 13

² TOTAL WIDTH / WIDTH WITHIN CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF UTICA, OH

(LICKING AND KNOX COS.)

FLOODWAY DATA

NORTH FORK LICKING RIVER

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

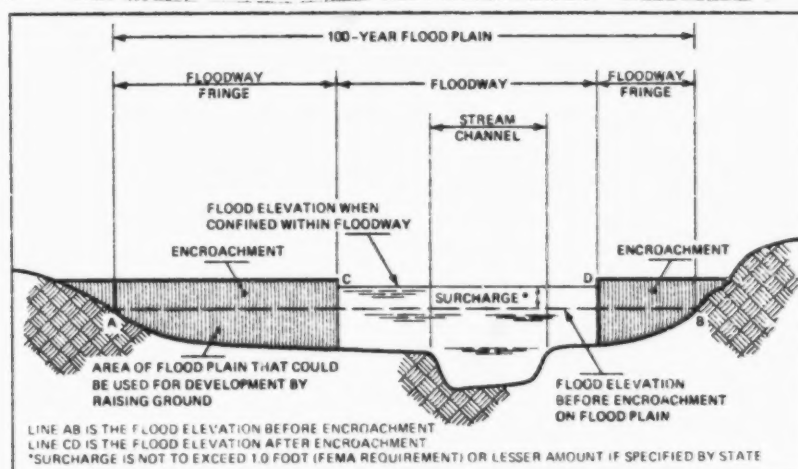


FIGURE 2 - Floodway Schematic

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Village of Utica.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 per cent of the reach.

Average Difference Between
10- and 100-year Floods

Variation

Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the Village of Utica are shown on the Flood Profiles and are summarized in Table 3, "Flood Insurance Zone Data."

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF's are used to set actuarial insurance premium rate tables based on FHF's from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHF's, the entire incorporated area of the Village of Utica was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A4: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.

Zone B: Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHF's, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of Utica is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

Flood Insurance Studies are currently in progress for the Unincorporated Areas of Licking and Knox Counties, Ohio (References 7 and 11). These studies include the North Fork Licking River.

The results of this study match exactly with the Knox County and the Licking County Flood Insurance Studies (References 7 and 11).

A Flood Hazard Boundary Map has been published for the community (Reference 9). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, (24th Floor), Chicago, Illinois 60606.

FLOODING SOURCE	PANEL ¹	ELEVATION DIFFERENCE ² BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION ³ (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
NORTH FORK LICKING RIVER REACH 1	0001	-2.0	-0.5	1.2	020	A4	VARIES—SEE MAP

¹FLOOD INSURANCE RATE MAP PANEL

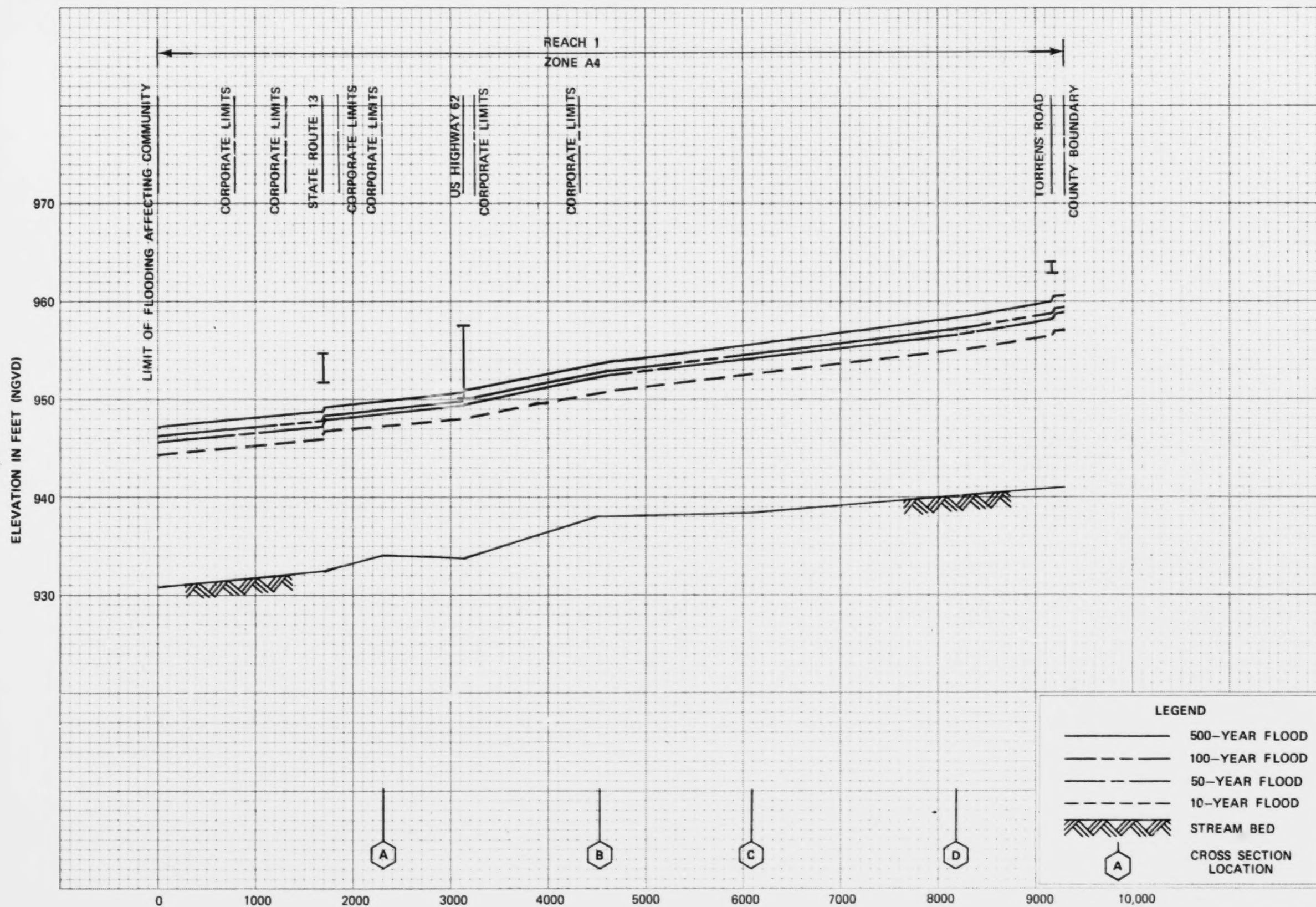
²WEIGHTED AVERAGE

³ROUNDED TO NEAREST FOOT

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOOD INSURANCE ZONE DATA
	VILLAGE OF UTICA, OH (LICKING AND KNOX COS.)	NORTH FORK LICKING RIVER

8.0 REFERENCES AND BIBLIOGRAPHY

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2. ———, Department of Natural Resources, Bulletin No. 35, Floods of January-February 1959 in Ohio, Columbus, Ohio, May 1961.
3. U.S. Department of Agriculture, Soil Conservation Service, Watershed Plan and Environmental Impact Statement for South Fork Licking River Watershed, Licking, Perry and Fairfield Counties, Ohio, June 1980.
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8. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 61, WSP-2 Water-Surface Profile Program, A Computer Program for Project Formulation, Hydraulics, May 1976.
9. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Utica, Ohio, April 1976.
10. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 64, Floodway Determination Computer Program, Glenn Dale, Maryland, June 1978.
11. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of Knox County, Ohio, (in progress).



STREAM DISTANCE IN FEET ABOVE LIMIT OF FLOODING AFFECTING COMMUNITY
(LIMIT OF FLOODING AFFECTING COMMUNITY IS 1700 FEET DOWNSTREAM OF STATE ROUTE 13)

FLOOD PROFILES
NORTH FORK LICKING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
VILLAGE OF UTICA, OH
(LICKING AND KNOX COS.)

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